Evaluating the Lions–Quest "Skills for Adolescence" drug education program
Second-year behavior outcomes[☆]

Marvin Eisen[a],*, Gail L. Zellman[b], David M. Murray[c]

[a]*The Urban Institute, 2100 M Street, Northwest, Washington, DC 20037, USA*
[b]*RAND, 1700 Main Street, Santa Monica, CA 90407, USA*
[c]*Department of Psychology, University of Memphis, Memphis, TN, 38152-6400, USA*

Abstract

Thirty-four schools ($n=7426$ consented sixth graders, 71% of the eligible population) were randomized to conditions to test the hypothesis that *Skills for Adolescence* (SFA), a widely used comprehensive life skills training curriculum with a dedicated drug education unit, is more effective than standard care in deterring and delaying substance use through middle school. Two-year posttest (1-year post-intervention) data were collected from 5691 eighth graders (77% of those who completed the sixth-grade survey and 87% of those who completed the seventh-grade survey). Lifetime and recent (last 30 days) use of five substances or combinations of substances was compared using mixed-model regression to control for school clustering. There were two significant treatment main effects at the end of the eighth grade: lifetime ($P=.05$) and recent ($P<.03$) marijuana use were lower in SFA than control schools with pretest usage and salient demographic and psychosocial variables controlled. There was also one significant Treatment×Pretest Usage interaction around binge drinking. Baseline binge drinkers in SFA schools were less likely to report recent binge drinking than students in control schools ($P<.01$); there were no treatment differences among baseline nonbinge drinkers. Analyses of potential mediators of SFA treatment effects on eighth-grade binge drinking and marijuana use suggested that SFA increased self-efficacy around drug refusal skills, but did not affect behavioral intentions, perceptions of harm, or perceived peer norms. These 2-year (1-year post-intervention) outcomes offer some additional support for SFA effectiveness and the general thrust of school-based, life skills-based prevention programs. The promising sixth- through eighth-grade findings for SFA, a

commercially available program, provide a further step in bridging a major gap in the "research to practice" literature: theory-based interventions that have documented behavioral effects have not enjoyed large-scale implementation, while intuition-based programs that have no documented effects still enjoy wide exposure.

1. Introduction

Teenage drug usage remains a serious problem in the US, despite efforts by policymakers, health officials, educators, and prevention scientists to reduce it. Against the backdrop of a generalized decline in cigarette smoking, alcohol consumption, and substance usage in the US population since the 1960s and 1970s, older (e.g., 12th graders) adolescent substance use appears to have stabilized at relatively high rates, while younger teen (e.g., eighth graders) usage rates have been rising (Department of Health and Human Services [DHHS], 2000; Substance Abuse and Mental Health Services Administration [SAMHSA], 1999). National data from the *2000 Monitoring the Future* (MTF) surveys show that more than 31% of 12th and about 15% of 8th graders smoked cigarettes in the last 30 days, with almost 3% of 8th graders smoking at least one-half pack a day, 50% of 12th and more than 22% of 8th graders reported alcohol use in the last 30 days, with 30% and 14%, respectively, reporting binge drinking (5+ drinks a day) in the last 14 days; almost 22% of seniors and 9% of junior high students had used marijuana in the last month; and about 2% of the older and 1% of the younger students had used cocaine in the same period (National Institute on Drug Abuse [NIDA], 1999).

Because of strong public demand for remedial action, school-based programs intended to prevent or delay substance abuse now reach about 90% of middle and high school students (NIDA, 1998). Many of these programs are funded through the federal Safe and Drug Free Schools Act and often school districts use these federal funds to purchase or subsidize drug education teacher training and curriculum materials in the belief that the training and programs will help deter, delay, or reduce their students' drug-related behavior. Until recently, there has been little governmental interest in prevention programming accountability and performance measurement. However, because of increasing substance use among early adolescents, as well as several highly visible and tragic incidents of school violence, impending regulations would restrict Safe and Drug Free Schools funding to programs that can document relatively stringent evidence-based behavior change criteria (Department of Education [DOE], 1998).

Interestingly, two of the three most popular middle school prevention programs in the US, Drug Abuse Resistance Education (DARE) and Here's Looking at You 2000 (HLAY 2000), have been evaluated extensively, but neither program has been found to be effective in deterring or reducing substance use (Ennett, Tobler, Ringwalt, & Flewelling, 1994; Gerstein

& Green, 1993; Lynam et al., 1999). As a consequence, neither program qualified as an evidence-based intervention under recently announced Safe and Drug Free Schools Act standards (DOE, 2001).

A third widely used curriculum, the Lions–Quest *Skills for Adolescence* (SFA), is a multicomponent life skills education program whose developers have trained more than 50,000 teachers and other school personnel to deliver the curriculum since the present (third) edition became commercially available in 1992 (Quest International, 2000). Until recently, there was no rigorous multisite, multiyear outcome evaluation of SFA to test its effectiveness regarding students' substance use. In the fall of 1997, a 3-year randomized school-based trial of SFA began. The overall goal was to compare the effectiveness of SFA against "standard" drug prevention in preventing or delaying the onset of students' tobacco, alcohol, and illegal substance use. The evaluation was designed to determine whether the SFA program had the following drug-related effects: (1) to prevent or significantly delay the initiation of "gateway" (alcohol, tobacco, and marijuana) drug use during the study period; (2) to reduce the amount or frequency of substances used among those who do initiate use before or during the study period; and (3) to prevent or delay the progression to more "advanced" substance use (e.g., binge drinking, regular smoking, and regular marijuana use) or to "hard" drug use following initiation, relative to control schools' usual drug prevention programming.

One-year posttest (baseline to end of the intervention school year) data were collected in May–June 1999. Initial findings indicated that recent cigarette smoking was lower in SFA schools than in control schools ($P<.05$), as was lifetime marijuana use ($P<.06$), when pretest usage and salient demographic and psychosocial variables were controlled. There were also three Treatment×Ethnicity interactions around drinking behaviors. Hispanics in SFA schools were less likely to ever and recently drink, or to recently binge drink than Hispanics in control schools; there were no treatment differences among non-Hispanics. Among baseline users of "gateway" substances, there were some significant delays among SFA students in transition to experimental or recent use of more "advanced" substances: drinking to smoking, drinking to marijuana use, and binge drinking to marijuana (Eisen, Zellman, Massett, & Murray, in press). The present study reports 2-year posttest (1-year post-intervention) findings.

2. Methods

2.1. Overview of experimental design

The Lions–Quest SFA evaluation was a group-randomized trial with schools as the unit of assignment. Thirty-four middle schools were recruited from four school districts in three major metropolitan areas during the fall and winter of 1997–1998. A baseline survey was conducted with all actively consented sixth graders in each school in the spring of 1998. Schools were pair-matched within each district on sixth-grade prevalence of any recent use (previous 30 days) of tobacco, alcohol, or one of several illicit drug from the pre-

intervention survey data and on parent consent rates, then randomized to study conditions from within pairs to reduce threats to internal validity. The study cohort in the 17 intervention schools received only SFA as their seventh grade drug education during the 1998–1999 school year, while their counterparts in the 17 comparison schools received their usual drug education programming. The comparison programs, which were generally left to the discretion of the teachers in each school, ranged from school assemblies to local teacher-devised classroom curricula to DARE exposure. One-year posttest (baseline to end of the intervention school year) data were collected in May–June 1999 (Eisen et al., in press). One-year follow-up data (i.e., 1-year post-intervention) were collected at the end of the eighth grade (May–June 2000) and are the subject of this report. A more detailed description of the study design and methods summarized in this and the following sections can be found in Eisen (in press).

2.2. Sampling plan and school recruitment

School districts and middle schools were recruited via a two-stage cluster sampling plan (Kish, 1965). In the first stage, 4 of the 10 largest metropolitan areas ranked by population size were selected at random. Within each of the selected areas (Los Angeles–Long Beach, CA; Detroit–Wayne County, MI; Washington, DC–Baltimore, MD; and Boston, MA) and then, within each of the public school districts that had at least four middle schools in the 1996–1997 school year, we prepared a complete enumeration of schools that met the following eligibility criteria: (1) contained Grades 6–8 or 7–9; (2) had an enrollment of at least 200 students by the end of the eighth or ninth grade; and (3) were not using SFA at that time.

Districts that met the above criteria were screened for interest in participation in the second stage. Individual schools had to agree to all aspects of the study, including randomization to condition and delivery of a 40-session version of SFA during the seventh-grade school year (1998–1999) if selected to the experimental condition. In exchange for the principal's agreement to participate, in each experimental school, all teachers who were scheduled to teach seventh-grade drug education, received free SFA teacher training and each of their students received free *SFA Student Workbooks* (approximate market value: US$10,000 per school). Comparison schools were offered equivalent teacher training and student materials for those interested in using the SFA curriculum after the study cohort completed middle school (i.e., after the eighth grade) to avoid potential school-based contamination.

The final school district sample consisted of one Los Angeles area district with 12 of its 82 middle schools participating, one Washington–Baltimore area district with eight of its 28 middle schools participating, one urban Detroit area district with 10 of its 44 middle schools, and one Wayne County area district with all four of its middle schools participating. Thus, in the first stage, major metropolitan areas were randomly selected for recruitment activities; then within metro areas, school districts, and then schools meeting eligibility criteria self-selected into participation. In the end, 34 middle schools from four school districts in three metropolitan areas were included in the study sample.

2.3. Student participants

Active parental consent to participate in the SFA evaluation was obtained from the parents of 7426 sixth-grade students across the 34 study schools (71% of the eligible population). About 60% of the sample was from the Los Angeles metro area, 22% from Detroit, and 18% from Washington–Baltimore. Females comprised 52% of the sample; Hispanic Americans 34%, African Americans 18%, and Asian Americans 7%; and 66% lived with both parents. The mean age of the sample was 11 at baseline (see Table 1).

2.4. SFA program content and teacher training

SFA utilizes a comprehensive array of strategies to teach social competency and refusal skills. Following the consensus from major drug education program evaluations (e.g., Botvin, Baker, Dusenbury, Tortu, & Botvin, 1990; Pentz et al., 1989) and meta-analyses (e.g., Tobler, in press), SFA program elements and processes utilize social influence and social cognitive approaches to teach cognitive–behavioral skills for building self-esteem and personal responsibility, communicating effectively, making better decisions, resisting social influences and asserting rights, and increasing drug use knowledge and consequences (Quest International, 1992).

A condensed, 40-session (35–45 minutes per session) version of the comprehensive (103 sessions) curriculum included three sessions on the challenges involved in entering the teen years, four on building self-confidence and communication skills, five on managing emotions in positive ways, eight on improving peer relationships (including resisting peer pressure), and 20 on living healthy and drug-free (Eisen, in press).

Anticipating that many schools might have some difficulties delivering a program that represented a major share of any one-semester class and to bring consistency and uniformity to the classroom teacher observations that were an integral part of the process evaluation, 8 of the 40 required sessions were deemed "key sessions." Teachers were required to address these specified sessions, knowing they would be observed by project staff during one or more of them. Each key session focused on a key element, component, or a technique associated with successful drug prevention programming such as developing communication skills, developing specific drug resistance skills, and increasing the perception of harm in using specific substances (Tobler, in press). However, by design, the SFA curriculum promotes a "zero-tolerance" approach to all substance use. In practice, this means that the curriculum does not provide discussion of substance use social norms and does not include an intervention component intended to modify students' beliefs regarding the actual prevalence of peer or adult substance use (Quest International, 1992).

Teachers selected by their principal to deliver SFA attended a 3-day workshop conducted by Quest International-certified trainers and were provided with teacher manuals and student workbooks (in either English or Spanish) for each participating student. The purposes of the workshop were to: (1) provide teachers with detailed explanations and practice sessions for teaching SFA; (2) learn and practice specific skill-building exercises such as cooperative learning, team building, communication skills, problem solving, and peer relationships;

Table 1

Demographic characteristics and drug prevalence rates for sixth grade students at baseline

	n	%[a]
Study Sites		
Los Angeles metro	4415	59.5
Detroit metro	724	9.8
Detroit suburban	927	12.5
Washington suburban	1358	18.3
Sex		
Female	3835	51.7
Male	3585	48.3
Missing	4	0.1
Age[b]		
Younger than 11	38	0.5
11	3790	51.1
12	3344	45
13	218	2.9
14	12	0.2
Missing	22	0.3
Race/ethnicity		
Asian American	526	7.1
American Indian	104	1.4
African American	1310	17.6
Hispanic American	2517	33.9
White	1909	25.7
Combination (of above groups)	514	6.9
Other	468	6.3
Missing	76	1.0
Living arrangements		
Live with both parents or guardians	4894	65.9
Live with mother only	1807	24.3
Live with father only	282	3.8
Live with neither parent	341	4.6
Missing	100	1.3
Education aspirations		
Not high school graduate	143	1.9
High school graduate	439	5.9
Go to college	330	4.4
College graduate	2797	37.7
College plus	3115	42.0
Missing	600	8.1

Table 1 (*continued*)

	n	%[a]
Used alcohol in last 30 days		
Yes	703	9.5
No	6687	90.1
Missing	34	0.5
Smoked cigarettes in last 30 days		
Yes	257	3.5
No	6931	93.4
Missing	236	3.2
Used marijuana in last 30 days		
Yes	225	3.0
No	6948	93.6
Missing	251	3.4
Used cocaine/crack in last 30 days		
Yes	78	1.1
No	7022	94.6
Missing	324	4.4
Used any other illicit drug in last 30 days		
Yes	171	2.3
No	6825	91.9
Missing	428	5.8

[a] Percentages may not equal 100 due to rounding.
[b] Age calculated as of May 1, 1998.

(3) reinforce the importance of maintaining fidelity to the session-by-session sequence of the intervention implementation; and (4) provide an overview of the process evaluation approach and classroom data collection requirements and procedures, and to gain their consent for participation and observation.

2.5. Data collection and substance use measures

All consented students were surveyed annually from the sixth through the eighth grade; all seventh-grade students attending the experimental schools were offered the SFA curriculum regardless of their evaluation consent status. Annual surveys were group administered in classrooms by trained interviewers using standard protocols and questionnaires were adapted or developed for this evaluation. The annual questionnaires were translated into Spanish and students could choose to complete the surveys in either English or Spanish. With few exceptions, the data collectors were blind to each school's treatment condition.

Additional in-school make-up sessions were conducted for students who were absent during regular classroom administration. Consented students who were not surveyed in

school were sent make-up questionnaires and offered free movie passes or comparable cash prizes for completing and mailing back the surveys.

Tobacco, alcohol, and illegal drug use prevalence rates were assessed through a set of standard items that was modified, when necessary, following pretesting with the target population. The three cigarette smoking questions have been established by the National Cancer Institute as standard items in several major smoking prevention studies (Perry, Kelder, Murray, & Klepp, 1992). Standard questions adapted from the MTF surveys on the incidence, prevalence, and personal effects of alcohol, marijuana, cocaine, and other illegal/illicit substances such as inhalants were also asked in each year (Johnston, O'Malley, & Bachman, 1996).

Potential mediators or intermediate outcomes included behavioral intentions, social influences and interpersonal perceptions, perception of harmful effects of drugs, and communication skills and self-efficacy around drug use refusal. Behavioral intentions to use tobacco, alcohol, marijuana, and cocaine in the next 3 months were assessed with items originally adapted from MTF (1=*definitely yes* to 4=*definitely no*). The time frame was reduced in these items and anchored to a concrete marker (the end of summer) because early adolescents have notoriously short future time perspectives (Eisen & Zellman, 1986). Social influence and interpersonal perceptions were assessed using standard questions on students' normative beliefs about the prevalence of substance use by a best friend (yes/no/I don't know), friends in general and same-grade peers (1=*all* to 5=*none*), as well as a three-item scale (alpha=.89) on whether using alcohol, cigarettes, and marijuana make it easier to "fit in" (1=*strongly agree* to 5=*strongly disagree*). Many of the social influence items were also adapted from questions used in MTF. Perceptions of the harmful or helpful effects of alcohol, binge drinking, smoking, marijuana, and cocaine were assessed with three-item scales focusing on whether each substance helps or harms one's health, ability to relax, and popularity (1=*very helpful* to 4=*very harmful*, alphas=.73–.83). Students' sense of self-efficacy around refusing the use of alcohol, cigarettes, marijuana, and cocaine in various situations (e.g., "... how easy or hard would it be to say 'no' to marijuana if you are at party with friends/at close friend's house—no parents home/hanging out with friends after school—not at someone's house?") was measured using separate three-item scales (alphas=.87–.92). These items were developed after a careful review and content analysis of the SFA communication and resistance skills classroom curriculum and role-play exercises used in the eight key sessions (Quest International, 1992). Perceived parent monitoring of students' behavior was assessed with a two-item scale focusing on knowing the students' whereabouts after school and on keeping close track of how they are doing in school (1=*never* to 5=*always*, alpha=.58). Psychosocial factors thought to be related to adolescent drug use such as propensity for sensation-seeking (Zuckerman, 1986) were include on the surveys (e.g., doing dangerous things just for fun, 1=*never* to 5=*always*), as well as demographic variables such as gender, age, family structure/household composition, and race/ethnicity. The latter was asked, "How would you describe yourself? (Mark all that apply)." Choices included Asian/Asian American, American Indian, Black/African American, Hispanic/Latino, White, and other.

2.6. Data analysis

The main focus of this report is the change in prevalence of substance use over the 2-year study interval from the sixth-grade baseline through the end of the eighth grade (1-year post-intervention). Changes in drug use from spring of 1998 through spring of 2000 were assessed on recent use rates of alcohol, binge drinking (three or more drinks at one time), cigarettes, marijuana, and "any other" drugs, including inhalants, and cocaine or crack to determine differences between SFA and control schools. Use of each substance was measured with items having five- to seven-point ordinal response categories (e.g., "never" or "none" to "more than 100 cigarettes [more than 5 packs]"). These ordinal indicators of lifetime and recent substance use then were recoded to 0=no/1=yes response categories.

The evaluation employed a nested cohort design in which students at each school were followed over time as a cohort (Murray, 1998). Mixed-model regression procedures, implemented via SAS PROC MIXED (version 6.12, SAS Institute, 1997), were used in analyzing the data. For the main effect analyses, the posttest value of each dependent variable was regressed on condition and adjustment was made for baseline use of each specific substance, study site (i.e., school district), key demographic variables, and psychosocial covariates. For these analyses, the race/ethnicity question was dummy coded (0 = no; 1 = yes) for each ethnicity endorsed by the participants. Because two or more ethnicities could be selected, a "combination" response category was also created (0 = one group; 1 = more than one group). In the final set of analyses, the effect of being Black or being Hispanic was compared against all other ethnic group categories (i.e., the reference group).

School was included as a random effect nested within conditions. In these analyses, the degrees of freedom (df) for the person-level covariates are removed from the df for the person-level error term and so do not reduce df available for the school-level error term. The use of these procedures was chosen in the analysis of outcomes (ordinal indicators of ever and recent substance use, recoded to 0/1) that have binomial distributions at the observation level, based on earlier findings that this analysis is robust to violations of normality assumptions (Hannan & Murray, 1996). Comparisons of least square means (adjusted for baseline substance use, demographic, and psychosocial variables) were evaluated at $P<.05$, two-tailed, with $df=1$ and $df=32$ in these analyses. This plan provides valid tests of the effects of interest and the statistical basis for generalizing findings to other schools and students like those included in the study (Murray, 1998).

Possible effect modifications due to pretest drug use and demographic factors were tested by adding terms to represent the interaction between condition and strata to the fixed effects and by adding terms to represent the interaction between strata and school nested within conditions to the random effects, if warranted by initial analysis of contingency tables.

Mediational effects of the intermediate outcome variables were assessed in two ways. First, the (direct) impact of the SFA program on hypothesized mediating variables for each major substance were computed using the same mixed-model regression approach outlined for the changes in prevalence rates from the sixth to eighth grade. Second, if statistically significant treatment effects were found for hypothesized mediators, then the eighth-grade measure of

those mediator(s) was added to the final outcome regression models for those substances for which a significant treatment effect occurred, to determine whether that effect remained significant with the hypothesized mediator included in the model.

3. Results

3.1. Baseline equivalence and attrition

Preliminary analyses were conducted to verify the effects of pair-matching schools on baseline drug use prior to randomization and to assess attrition effects at the eighth-grade follow-up. The baseline analysis indicated an overall 30-day prevalence rate of 14% for a composite measure of "any drug use" (no/yes) and that the 17 SFA and the 17 control schools were equivalent with respect to self-reported drug use prior to the seventh-grade SFA intervention program (14% vs. 14%). The composite measure was a combination of recent (last 30 days) use rates for any of five major substances: alcohol (9.5%), cigarettes (3.5%), marijuana (3%), cocaine/crack (1.1%), and any other illicit drugs (2.3%).

Two-year postbaseline data were collected from 5694 students (77% of the consented baseline sample and 87% of those who completed the seventh-grade survey) in the spring of 2000. Multivariate analysis of sixth- to eighth-grade attrition indicated only one significant baseline difference in recent drug use between students who did and did not complete the eighth-grade annual survey: More of those who had used marijuana recently left the study sample than those who had not (37% vs. 23%, $P<.001$). Those percentages were virtually identical in both conditions, so there was no differential attrition of baseline marijuana users from either group. There were two between-school district differences (fewer completers from Detroit and the Wayne County districts), as well as a few demographic and baseline psychosocial variables associated with study attrition: being African American, coming from a single-parent household, reporting a greater percentage of close friends who smoked cigarettes at baseline, and reporting less consistent/frequent parental monitoring of activities and school work. Again for these contextual and demographic variables, the percentages leaving the study were very similar across treatment and comparison schools, with no differential attrition evident. Taken together, these attrition data indicate little to bias the findings reported in subsequent sections.

3.2. Changes in prevalence rates by condition

Outcome analyses were conducted using a conservative "intent to treat" approach, i.e., students in each condition were retained in the analyses based of their seventh-grade school assignment and without regard to the amount of program SFA teachers reported delivering (mean=32.74 of 40 sessions). As expected, there were statistically significant increases in recent amount/frequency of use for alcohol, binge drinking, cigarettes, and marijuana reported between the sixth and eighth grades for both the SFA and control conditions (not shown).

There were significant treatment effects for one of the five substances measured at the end of the eighth grade: lifetime marijuana use was lower in SFA than control schools ($P=.05$), as was recent (past 30 days) marijuana use ($P=.03$) with pretest usage and salient demographic and psychosocial variables controlled. No significant main effects were found for lifetime or recent use of alcohol, cigarettes, or other illicit substances. (See Table 2 for posttest means and their associated P levels for each substance measured.)

There was also one significant Treatment×Pretest Usage interaction around binge drinking. Baseline binge drinkers in SFA schools were less likely to report recent binge drinking at the end of the eighth grade (27%) than students in control schools (37%, $P<.01$); there were no treatment differences among baseline nonbinge drinkers (SFA=12%, control=12%).

3.3. Changes in hypothesized mediating variables by condition

The SFA program was expected to strengthen students' behavioral intentions not to use drugs in the near future, to increase the perceived harm of drug use, to increase the sense of self-efficacy about their ability to refuse drugs, and to decrease perceptions that using drugs makes it easier to fit in. However, because SFA intentionally does not focus on or attempt to change social peer norms about the acceptability and actual prevalence of substance use, it was not anticipated that these norms would be affected by the intervention. Table 3 presents

Table 2
Adjusted substance use prevalence rates of eighth grade students at the spring of 2000 follow-up

Variable	SFA (%)	Control (%)	Difference	95% confidence interval	P
Alcohol					
Lifetime	66.97	66.33	0.64	−2.25, 3.53	.66
30-day	22.85	23.18	−0.33	−3.01, 2.35	.8
Binge drinking (3+) 30-day	12.67	13.11	−0.44	−2.78, 1.91	.71
Cigarettes					
Lifetime	28	27.5	0.5	−1.99, 2.99	.69
30-day	12.47	11.48	0.98	−0.66, 2.63	.23
Marijuana					
Lifetime	27.24	30.5	−3.26	−6.55,−0.0	.05
30-day	11.32	13.79	−2.47	−4.70,−0.23	.03
Other illicit substances					
Lifetime	18.95	18.44	0.51	−1.87, 2.90	.66
30-day	6.89	6.98	0.09	−1.66, 1.48	.91

Values were adjusted for baseline age, gender, race/ethnicity, two-parent household, site, sensation seeking, baseline survey language, and pretest drug use. The student sample size ranged from 5316 to 5610 depending on outcome variable analyzed. Differences between conditions are based on the $F(1,32)$ statistic.

Table 3
Adjusted behavioral intentions, drug perceptions, refusal, self-efficacy, and perceived peer norms of eighth grade students at the spring of 2000 follow-up

Variable	SFA		Control		P
	Mean	S.E.	Mean	S.E.	
Behavioral intention (high = greater)					
Drink alcohol	3.11	0.04	3.12	0.04	.865
Smoke cigarettes	3.49	0.03	3.48	0.03	.877
Use marijuana	3.49	0.03	3.47	0.03	.595
Use cocaine/crack	3.82	0.02	3.84	0.02	.436
Perceived harm (high = more)					
Alcohol	11.79	0.14	11.80	0.15	.942
Binge drinking	12.29	0.13	12.40	0.13	.570
Cigarette smoking	12.72	0.12	12.76	0.13	.842
Marijuana use	12.37	0.14	12.23	0.14	.481
Cocaine use	13.77	0.12	13.81	0.12	.819
Refusal self-efficacy (high = harder)					
Alcohol	4.48	0.06	4.65	0.06	.044
Cigarette	4.28	0.06	4.39	0.06	.187
Marijuana	4.43	0.07	4.68	0.07	.021
Cocaine	3.94	0.06	3.99	0.06	.503
Perceived peer use—close friends (high = greater)					
Alcohol	3.90	0.05	3.89	0.06	.859
Cigarettes	4.02	0.06	4.08	0.06	.443
Marijuana	4.04	0.06	4.02	0.06	.868
Cocaine	4.67	0.03	4.69	0.03	.621

Values were adjusted for pretest drug use. The student sample ranged from 5316 to 5610 depending on outcome variable analyzed. Differences between conditions are based on the $F(1,32)$ statistic.

the results of the mixed-model regressions for the hypothesized mediators associated with each primary substance measured.

Significant treatment effects were found only for increasing students' sense of self-efficacy about being able to refuse offers of marijuana ($P<.02$) and of alcohol ($P<.05$) in a variety of situations, with baseline self-efficacy and drug use controlled. There were no significant effects on refusal self-efficacy for cigarettes or cocaine. Moreover, there were no significant treatment effects for any of the other hypothesized mediators measured across each of the specific substances (see Table 3).

Finally, as an additional assessment of the potential mediating effect of marijuana refusal self-efficacy on recent marijuana use and alcohol refusal self-efficacy on recent binge drinking, each of those terms was added to the significant regressions previously reported. Inclusion of the marijuana refusal self-efficacy measure reduced the SFA treatment interaction effect substantially (from $P<.04$ to $P<.10$); while inclusion of alcohol self-efficacy left the SFA treatment interaction effect virtually unchanged ($P<.01$ to $P<.01$).

4. Discussion

These results indicate that: (1) exposure to an abbreviated version of the SFA life skills education curriculum delivered in the seventh grade can help reduce the prevalence of lifetime and monthly marijuana use through the end of the eighth grade; (2) that these effects held across genders and all racial/ethnic groups studied; and (3) that this program was especially helpful in reducing the prevalence of binge drinking among students who had initiated regular binge drinking by the end of the sixth grade.

These findings, building upon those previously reported for the 1-year posttest (Eisen et al., in press), constitute the first empirical evidence that a widely used, commercially available drug prevention curriculum produces salutary primary or secondary prevention effects on students' substance use behaviors over a 2-year follow-up period (including 1 year after the intervention ended). The results are noteworthy because they begin to bridge an important "research to practice" gap in the literature: theory-based programs that include proven prevention concepts and techniques have rarely been implemented on a large scale (e.g., Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995; Pentz et al., 1989; Perry et al., 1992) while widely used intuition-based programs (such as DARE and HLAY 2000) have not been demonstrated to be effective in altering student substance use behavior (Gerstein & Green, 1993; Lynam et al., 1999).

More fundamentally, these encouraging initial results support the general thrust of universal-level, life skills-based prevention programs: self-contained school interventions designed to help students translate their knowledge and attitudes into positive actions by enhancing their interpersonal skills and social competencies. SFA's short-term effects are consistent with longer-term findings from other life skills programs such as Botvin's *Life Skills Training* (LST), which uses a cognitive–behavioral approach that teaches both domain-specific skills (e.g., understanding social influences including media) and generic social skills (e.g., anxiety management and assertiveness training). Impact evaluation data from LST show delayed or reduced use of tobacco and marijuana, as well as lower prevalence of heavy alcohol use over a 3-year period. Results from a 6-year follow-up study substantiated and extended the earlier reductions in drug and polydrug use (Botvin et al., 1990, 1995).

Like LST and other successful social influence-based interventions (e.g., Dent et al., 1995; Ellickson & Bell, 1990; Sussman et al., 1993), SFA is designed to teach students cognitive skills for building self-esteem and personal responsibility, communicating effectively, making better decisions, and increasing drug use knowledge and consequences, as well as behavioral skills for resisting social influences and asserting rights. Based on similarities to proven intervention approaches and program elements, our 2-year results offer hope that SFA may also continue to produce positive outcomes over time.

Our study design included a number of features that allowed a reasonable test of SFA. Random selection of metropolitan areas for initial school district recruitment, and inclusion of inner city and suburban school districts and schools assured a large multiethnic sample. Random assignment of schools to study conditions from within pairs matched within their school districts helped ensure baseline comparability on major outcome indicators. A high (active) parent consent rate (71%) as well as a relatively high retention for in-school data

collection (84% of the eligible sample at the end of the first and 77% at the end of the second year) should provide the basis for producing credible findings concerning longer-term effects of SFA.

The study's limitations must be considered as well. Those students whose parents failed to return the consent form or denied consent cannot be assumed to be the same as those students with more compliant parents. Due primarily to school districts' reluctance to implement individualized drug use detection procedures (e.g., CO testing), usage data probably reflect some level of self-report bias. Attrition from sixth to eighth grade was not random, but was associated with reported sixth grade marijuana use. Even though assignment of schools to condition was random in each district, schools self-selected into the study. Each of these factors limits the generalizability of the present findings.

We are also aware that many well-designed and well-implemented school-based drug prevention interventions have shown initially encouraging behavior effects over the first couple of years, only to dissipate with time (e.g., Ellickson, Bell, & McGuigan, 1993; Tobler, in press). Nevertheless, given the number and range of substances affected by the SFA intervention in either the first or second year, we are cautiously optimistic regarding longer-term SFA program impact. To our knowledge, these results provide the first tangible evidence that elements of a commercially available and widely used prevention program can delay regular marijuana use and reduce binge drinking among early onset drinkers for at least a 1-year post intervention period.

Continuing assessment of program implementation and fidelity data will allow us to determine more specifically how these effects were produced, while additional data collection should afford opportunities to see whether the effects will be sustained over time.

References

Botvin, G., Baker, E., Dusenbury, L., Botvin, E., & Diaz, T. (1995). Long-term follow-up results of a randomized drug abuse prevention trial in a white middle class population. *JAMA, the Journal of the American Medical Association, 273*, 1106–1112.

Botvin, G., Baker, R., Dusenbury, L., Tortu, S., & Botvin, E. (1990). Preventing adolescent drug abuse through a multimodal cognitive–behavioral approach: results of a 3-year study. *Journal of Consulting and Clinical Psychology, 58*, 437–446.

Dent, C. W., Sussman, S., Stacy, A. W., Craig, S., Burton, D., & Flay, B. R. (1995). Two-year behavior outcomes to project towards no tobacco use. *Journal of Consulting and Clinical Psychology, 63* (4), 676–677.

Department of Education. (1998). *Announcement: the expert panel on safe, disciplined and drug-free schools searching for best programs*. Washington, DC: The Safe and Drug-Free Schools Program. Available at: http://www.ed.gov/offices/OESE/SDFS/programs.html.

Department of Education. (2001). *Announcement: safe, disciplined, and drug-free schools expert panel exemplary programs (2001)*. Washington, DC: The Safe and Drug-Free Schools Program. Available at: http://www.ed.gov/offices/OERI/ORAD/KAD/expert_panel/2001exemplary_sddfs.html.

Department of Health and Human Services (2000). *Healthy people 2010* (conference edition). Washington, DC: Public Health Service (two volumes).

Eisen, M. (in press). Intermediate outcomes from a life skills education program with a media literacy component. In W. Crano (Ed.), *Mass media and drug prevention: classic and contemporary theories and research.* Hillsdale, NJ: Erlbaum.

Eisen, M., & Zellman, G. (1986). The role of health belief attitudes, sex education, and demographic factors on adolescents' sexual knowledge. *Health Education Quarterly, 13*, 9–22.

Eisen, M., Zellman, G., Massett, H., & Murray, D. (in press). Evaluating the Lions–Quest '*Skills for Adolescence*' drug education program: one-year behavior outcomes. *Addictive Behaviors.*

Ellickson, P., & Bell, R. (1990). Drug prevention in junior high: a multi-site longitudinal test. *Science, 247*, 1299–1305.

Ellickson, P., Bell, R., & McGuigan, K. (1993). Preventing adolescent drug use: long-term results of a junior high program. *American Journal of Public Health, 83*, 856–861.

Ennett, S., Tobler, N., Ringwalt, C., & Flewelling, R. (1994). How effective is Drug Abuse Resistance Education? A meta-analysis of Project DARE outcome evaluations. *American Journal of Public Health, 84*, 1394–1401.

Gerstein, D., & Green, L. (1993). *Preventing drug abuse: what do we know?* Washington, DC: National Academy Press.

Hannan, P., & Murray, D. (1996). Gauss or Bernoulli? A Monte Carlo comparison of the performance of the linear mixed-model and the logistic mixed-model analyses in simulated community trials with a dichotomous outcome variable at the individual level. *Evaluation Review, 20*, 338–352.

Johnston, L., O'Malley, P., & Bachman, J. (1996). *National survey results on drug use from the Monitoring the Future study, 1975–1995: Vol. I. Secondary school students* [NIH Publication No. 97-4139]. Rockville, MD: National Institute on Drug Abuse.

Kish, L. (1965). *Survey sampling*. New York: Wiley.

Lynam, D., Milich, R., Zimmerman, R., Novak, S., Logan, T., Martin, C., Leukefeld, C., & Clayton, R. (1999). Project DARE: no effects at 10-year follow-up. *Journal of Consulting and Clinical Psychology, 67*, 590–593.

Murray, D. M. (1998). *Design and analysis of group-randomized trials*. New York: Oxford University Press.

National Institute on Drug Abuse. (1998, December 28). *Drug use eases among teens for second consecutive year; Secretary Shalala also announces NIDA goes to school initiative* [NIDA Media Advisory].

National Institute on Drug Abuse. (1999, December 17). *Drug trends in 1999 among American teens are mixed* [National Press Release].

Pentz, M. A., Dwyer, J. H., MacKinnon, D. P., Flay, B. R., Hansen, W. B., Yu, E. I., Wang, M. S., & Johnson, C. A. (1989). Multi-community trial for primary prevention of adolescent drug abuse. *JAMA, the Journal of the American Medical Association, 261*, 3259–3266.

Perry, C., Kelder, S., Murray, D., & Klepp, K. (1992). Long term outcomes of the Minnesota heart health program and the class of 1989 study. *American Journal of Public Health, 82*, 1210–1216.

Quest International (1992). *Lions–Quest Skills for Adolescence* (3rd ed.). Newark, OH: Author.

Quest International. (2000). Personal communication from Gregory Long (Director of Training).

SAS Institute (1997). *SAS/STAT software: changes and enhancements (release 6.12)*. Cary, NC: SAS Institute.

Substance Abuse and Mental Health Services Administration, Department of Health and Human Services (1999). *Fact Sheet: 1998 national household survey on drug abuse*. Washington, DC: Author.

Sussman, S., Dent, C. W., Stacy, A. W., Sun, P., Craig, S., Simon, T. R., Burton, D., & Flay, B. R. (1993). Project towards no tobacco use: 1-year behavior outcomes. *American Journal of Public Health, 83* (9), 1245–1250.

Tobler, N. (in press). School-based adolescent drug prevention programs: 1998 meta-analysis. *Journal of Primary Prevention.*

Zuckerman, M. (1986). *Sensation seeking and the endogenous deficit theory of drug abuse* [Monograph 74, NIDA Research Monograph Series: 59-70]. Rockville, MD: National Institute on Drug Abuse.